REMARKS

The Office Action dated June 27, 2007 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 1-11, 14, 16-18, 20, and 21, are amended to more particularly point out and distinctly claim the subject matter of the present invention. Claim 19 is cancelled without disclaimer or prejudice, and new claims 22-29 are added. Support for the amendments is found at least in paragraph [0034] of the preset specification. No new matter is added. Claims 1-18 and 20-29 are respectfully submitted for consideration.

The Office Action rejected claims 18-20 under 35 U.S.C. 101 for being directed to non-statutory subject matter. Applicants respectfully submit that claims 18 and 20 are amended to be more clearly directed to computer program embodied on a computer readable medium. As stated above, claim 19 is cancelled. Accordingly, withdrawal of the rejection under 35 U.S.C. 101 is respectfully requested.

The Office Action rejected claims 1, 3, 9, 11, 14, and 18-21 are under 35 U.S.C. 102(e) as being anticipated by US Patent No 6,853,678 to Hasegawa et al. (Hasegawa). Applicants respectfully submit that Hasegawa fails to disclose or suggest all of the features recited in any of the pending claims. The rejection of claim 19 is moot in light of the cancellation of this claim.

Claim 1, from which claims 2-8 depend, is directed to a method of synchronizing with a pattern sequence. A first calculation is performed that calculates a complex

product of two adjacent symbols of a first pattern sequence, the symbols comprising amplitude and phase information, thereby obtaining a first differential phase information sequence. A second calculation calculates a complex product of two adjacent symbols of a second pattern sequence, the symbols comprising amplitude and phase information, thereby obtaining a second differential phase information sequence. The first and second differential phase information sequences are correlated , thereby obtaining a correlation result. Synchronization is determined between the first and second pattern sequences based on the obtained correlation result.

Claim 9, from which claims 10-13 depend, is directed to an apparatus for synchronizing with a pattern sequence. A first means calculates a complex product of two adjacent symbols of a first pattern sequence, the symbols comprising amplitude and phase information, and outputs a first differential phase information sequence. A second means calculates a complex product of two adjacent symbols of a second pattern sequence. The symbols include amplitude and phase information. A second differential phase information sequence is output. A third means correlates the first and second differential phase information sequences, and outputs a correlation result. A synchronization is determined between the first and second pattern sequences based on the correlation result.

Claims 14, from which claims 15-17 depend, is directed to A system for synchronizing with a pattern sequence the system including a transmitting device and a receiving device. Symbols of a pattern sequence to be used for synchronization are

generated. A transmitting means transmits the symbols of the pattern sequence. The receiving device includes a first means for calculating a complex product of two adjacent symbols of a reference pattern sequence, the symbols comprising amplitude and phase information, and outputting a first differential phase information sequence. A receiving means receives the symbols of the pattern sequence transmitted by the transmitting device. A second means calculates a complex product of two adjacent received symbols of the pattern sequence, the symbols comprising amplitude and phase information, and outputting a second differential phase information sequence. A third means correlates the first and second differential phase information sequences, and outputs a correlation result. A synchronization is determined between the received and reference pattern sequences based on the correlation result.

Claim 18, from which claim 20 depends, is directed to a computer program embodied on a computer readable medium, comprising software code portions for performing a method. A first calculation is performed for calculating a complex product of two adjacent symbols of a first pattern sequence. The symbols include amplitude and phase information, thereby obtaining a first differential phase information sequence. A second calculation calculates a complex product of two adjacent symbols of a second pattern sequence. The symbols comprising amplitude and phase information, thereby obtaining a second differential phase information sequence. A correlation is performed for correlating the first and second differential phase information sequences, thereby

obtaining a correlation result. A synchronization is determined between the first and second pattern sequences based on the obtained correlation result.

Claim 21 is directed to a system for synchronizing with a pattern sequence including a transmitting device and a receiving device. The transmitting device includes a symbol generator for generating symbols of a pattern sequence to be used for synchronization. A transmitter transmits the symbols of the pattern sequence. The receiving device includes a first processor for calculating a complex product of two adjacent symbols of a reference pattern sequence including amplitude and phase information, and outputting a first differential phase information sequence. A receiver receives the symbols of the pattern sequence transmitted by the transmitting device. A second processor calculates a complex product of two adjacent received symbols of the pattern sequence, including amplitude and phase information, and outputting a second differential phase information sequence. A third processor correlates the first and second differential phase information sequences, and outputs a correlation result. A fourth processor determines synchronization between the received and reference pattern sequences based on the correlation result.

Applicants submit that each of the pending claims recites features that are neither disclosed nor suggested in any of the cited references.

Hasegawa describes a synchronizing circuit. Fig. 4 of Hasegawa shows the structure of a receiving circuit. From the receiving circuit, a CPU 13 obtains correlation values b1 through b4 from the count values C1 through C4. The correlation value b1 is a

correlation value between the I-signal and -1/2-chip delayed C/A code. The correlation value b2 is a correlation value between the I-signal and 0-chip delayed C/A code. The correlation value b3 is a correlation value between the I-signal and +1/2-chip delayed C/A code. The correlation value b4 is a correlation value between the Q-signal and 0-chip delayed C/A code. The CPU 13 obtains a correlation d0 between the I-signal and Q-signal, and the internally generated code from the correlation value b2 and correlation b4. The CPU 13 compares the correlation d0 with a threshold. When the correlation d0 is smaller than the threshold, the CPU 13 provides a frequency control signal to the oscillating circuit 38. The oscillating circuit 38 controls the frequency of the oscillation signal provided to the multipliers 32 and 33 according to the frequency control signal from the CPU 13. The CPU 13 repeats the above-mentioned operation until the correlation d0 exceeds the threshold. When the correlation d0 exceeds the threshold, the CPU 13 performs a lock operation.

The receiving circuit shown in Fig. 5 of Hasegawa differs from that shown in Fig. 4 in that the C/A-code generating circuit 31' generates, in addition to the -1/2-chip delayed C/A code, 0-chip delayed C/A code and +1/2-chip delayed C/A code, -1-chip delayed C/A code delayed from the 0-chip delayed C/A code by one chip. Thus, according to Hasegawa the correlation values are obtained by correlating two different code sequences.

Applicants respectfully submit that Hasegawa fails to disclose or suggest at least the features of "performing a first calculation for calculating a complex product of two

adjacent symbols of a first pattern sequence, the symbols comprising amplitude and phase information, thereby obtaining a first differential phase information sequence," "performing a second calculation for calculating a complex product of two adjacent symbols of a first pattern sequence, the symbols comprising amplitude and phase information, thereby obtaining a second differential phase information sequence" and correlating the first and second differential phase information sequences, as recited in claim 1 and similarly recited in claims 9, 14, 18 and 21.

As discussed above, according to Hasegawa the correlation values are obtained by correlating two (different) code sequences. However, in the presently claimed invention, a first differential phase information sequence is calculated from a first pattern sequence and a second differential phase information sequence is calculated from a second pattern sequence. Thus, according to the presently claimed invention, the differential phase information sequence is calculated from adjacent symbols of the pattern sequence, e.g. a currently received symbol and a previous symbol (see paragraph [0034] of the present invention).

Applicants respectfully submit that because claims 3, 11, and 20 depend from claims 1, 9, and 18, these claims are allowable at least for the same reasons as claim 1, 9, and 18 as well as for the additional features recited in these dependent claims.

Based at least on the above, Applicants respectfully submit that Hasegawa fails to disclose or suggest all of the features recited in claims 1, 3, 9, 11, 14, and 18, 20 and 21.

Accordingly, withdrawal of the rejection under 35 U.S.C. 102(e) is respectfully requested.

The Office Action rejected claims 4, 6, 8, and 13 under 35 U.S.C. 103(a) under 35 U.S.C. 103(a) as being obvious over Hasegawa in view of Applicant's Admitted Prior Art (APA) (page 2 paragraph [0006] of the present specification.). The Office Action took the position that Hasegawa disclosed all of the features of these claims except detecting the symbols of the second pattern sequence in the data symbol stream based on the different modulation. The Office Action asserted that this is disclosed in APA. Applicants respectfully submit that Hasegawa and APA fail to disclose or suggest all of the features recited in any of the above claims. Specifically, Hasegawa is deficient at least for the reasons discussed above, and this deficiency is not cured in APA.

Based at least on the above, Applicants submit that Hasegawa and APA fail to disclose or suggest all of the features recited in claims 4, 6, 8, and 13. Accordingly, withdrawal of the rejection under 35 U.S.C. 103(a) is respectfully requested.

The Office Action rejected claim 7 under 35 U.S.C. 103(a) as being obvious over Hasegawa and APA and further in view of US Patent Publication No. 2002/0179776 to Sumasu et al. (Sumasu). The Office Action took the position that Hasegawa disclosed all of the features recited in claim 7 except the IQ pilot symbols comprise quadrature phase shift keying (QPSK) modulated symbols, and the IQ pilot symbols of the second pattern sequence are periodically inserted into the data symbol stream at the transmitting device. The Office Action asserted that Sumasu disclosed these features. Applicants respectfully

submit that the cited references, taken individually or in combination, fail to disclose or suggest all of the features recited in claim 7. Specifically, Applicants respectfully submit that Hasegawa and APA are deficient at least for the reasons discussed above and Sumasu fails to cure these deficiencies.

Sumasu is directed to multicarrier communications. Sumasu describes a digital modulation section the performs predetermined modulation such as QPSK on transmission data and outputs the modulated signal to the S/P conversion section. In the modulated signal a serial data string is converted into a parallel data string. However, Applicants respectfully submit that Samusa fails to cure the significant deficiencies of Hasegawa and APA discussed above.

Based at least on the above, Applicants respectfully submit that the cited references fail to disclose or suggest all of the features recited in claim 7. Accordingly, withdrawal of the rejection under 35 U.S.C. 103(a) is respectfully requested.

The Office Action rejected claims 12 and 15 under 35 U.S.C. 103(a) as being obvious over Hasegawa, in view of Samasu. The Office Action took the position that Hawegawa disclosed all of the features of these claims except a storing means for storing the first pattern sequence and a first modulating means and scheme and second modulating means and scheme and inserting the symbols of the pattern sequence into the data symbol stream. The Office Action asserted that Samasu disclosed these features. Applicants respectfully submit that the cited references, taken individually or in combination, fail to disclose or suggest all of the features recited in any of the pending

claims. Specifically, Applicants submit that as discussed above, Samusa fails to cure the significant deficiencies of Hasegawa.

Based at least on the above, Applicants respectfully submit that the cited references fail to disclose or suggest all of the features recited in claims 12 and 15. Accordingly, withdrawal of the rejection under 35 U.S.C. 103(a) is respectfully requested.

As stated above, new claims 22-29 are added. Applicants respectfully submit that each of claims 22-29 recites features that are neither disclosed nor suggested in any of the cited references.

Applicants respectfully submit that each of claims 1-18 and 20-29 recite features that are neither disclosed nor suggested in any of the cited references. Accordingly, it is respectfully requested that each of claims 1-18 and 20-29 be allowed, and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

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Enclosures: Additional Claim Fee Transmittal
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